

Momentum Practice Problems

1. A 0.50 kg football is thrown with a velocity of 15 m/s to the right. A stationary receiver catches the ball and brings it to rest in 0.020 s. What is the force exerted on the ball by the receiver? [380 N to the left]
2. A 0.40 kg soccer ball approaches a player horizontally with a velocity of 18 m/s to the north. The player strikes the ball and causes it to move in the opposite direction with a velocity of 22 m/s. What impulse was delivered to the ball by the player? [16 kg m/s to the south]
3. A 2.5 kg ball strikes a wall with a velocity of 8.5 m/s to the left. The ball bounces off with a velocity of 7.5 m/s to the right. If the ball is in contact with the wall for 0.25 s, what is the constant force exerted on the ball by the wall? [160 N to the right]
4. An 85 kg fisherman jumps from a dock into a 135 kg rowboat at rest on the west side of the dock. If the velocity of the fisherman is 4.30 m/s to the west as he leaves the dock, what is the final velocity of the fisherman and the boat? [1.66 m/s to the west]
5. A boy on a 2.0 kg skateboard initially at rest tosses an 8.0 kg jug of water in the forward direction. If the jug has a speed of 3.0 m/s relative to the ground and the boy and skateboard move in the opposite direction at 0.60 m/s, find the boy's mass. [38 kg]
6. A 4.0 kg bowling ball sliding to the right at 8.0 m/s has an elastic head-on collision with another 4.0 kg bowling ball initially rest. The first ball stops after the collision. Find the velocity of the second ball after the collision. [8.0 m/s to the right]
7. A green 3.00 kg ball moving 12.0 m/s hits a non-moving 2.00 kg ball. After they hit, the red ball is moving to the right at a 52 degree angle from the green ball's original direction. The green ball is now moving at a 38 degree angle to the left of its original direction.
 - a. What is the red ball's final momentum? [22.2 kg m/s]
 - b. What is the green ball's final velocity? [9.47 m/s]